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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/988,630	11/20/2001	Naoki Chiba	33240M014	8915

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EXAMINER	
ROSARIO, DENNIS	
ART UNIT	PAPER NUMBER
2621	

DATE MAILED: 07/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/988,630	CHIBA, NAOKI	
	Examiner	Art Unit	
	Dennis Rosario	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *amt. 08 February 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11/20/2001 2/08/2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Amendment

1. The amendment was received on February 8, 2005. Claims 1-12 are pending.

Drawings

2. Due to the amendment, the objection to figure 5 is withdrawn.

Response to Arguments

3. Applicant's arguments filed 2/8/2005, page 5 to 6 have been fully considered but they are not persuasive.

4. Page 5 and 6 of the remarks states, "Altunbasak neither teaches nor fairly suggests the Applicant's recited second and third means (and corresponding method steps)."

However, Altunbasak does teach the Applicant's recited second and third means (and corresponding method steps) as indicated in the office action for claims 1,3,5,7,9 and 11, below. In general, refer to col. 13, line 59, which discloses a "hybrid system" in col. 13, line 59 that "alternates" in col. 13, line 59 between "motion parameters" in col. 13, lines 60,61 and a "lens-distortion parameter" in col. 13, line 62. In other words, "motion parameters" in col. 13, lines 60,61 or the claimed geometric transform factors can be solved using a hybrid system based on coordinates, x_g y_g, x'_g, y'_g of equation 42, then the hybrid system modifies equation 42 that is an equation of the above mentioned coordinates to "estimate" in col. 13, line 62 a lens-distortion parameter, κ_7, in col. 13, line 66 or the claimed lens distortion factor based on the claimed geometric transform factors also referred to as "affine parameters [that are] clamped" in col. 13, lines 66,67.

Alternatively, a lens distortion parameter, κ_7 or a linear "lens-distortion parameter" in col. 14, line, 30, which corresponds to the claimed lens distortion factor, is "recover[ed]" in col. 14, line 30 during "Linearization in Geometric Correction" in col. 14, line 1 with respect to the nonlinear κ_7 or "lens distortion parameter" in col. 13, line 62 of the method of "Nonlinear Geometric Correction" in col. 13, line 25. Thus, κ_7 or a linear "lens-distortion parameter" in col. 14, line, 30 during "Linearization in Geometric Correction" in col. 14, line 1 or the claimed third means is based on a second means "Nonlinear Geometric Correction" in col. 13, line 25 which in turn is based on the claim first means as shown in figure 2.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Altunbasak et al. (US Patent 6,597,816 B1).

Regarding claim 1, Altunbasak et al. discloses in a lens distortion factor calculating apparatus and method for subjecting an image picked up by image pick-up means having a lens to lens distortion correction, the lens distortion factor calculating apparatus comprises:

a) first means (Equations 33 and 34 in column 11 which is illustrated in fig. 2 as vertical arrows.) for finding, on the basis of two images (fig. 2, numerals 220 and 240) picked up by the image pick-up means (fig. 1, num. 110 is an image capture device in col. 2, line 39.), the coordinates of a plurality of corresponding points (A point in image 220 is in the upper left corner and a point in image 240 is in the lower right corner, which corresponds to coordinates (x_g, y_g) and (x,y) of equations 33 and 34, is picked up by the image pick-up means of fig. 1,num. 110 where the points of images 220 and 240 is a plurality of corresponding points because the point of image 240 is the same point of image 220.) between the images (fig. 2, numerals 220 and 240);

b) second means ("[A]ffine model" in col. 12, line 63 is a second means that is applied "subsequent[ly]" in col. 12, line 64 to equations 33 and 34 as mentioned from col. 12, line 62 to col. 13, line 25 and illustrated in fig. 2 as horizontal arrows to derive equation 41 of column 13.) for calculating ("[A]ffine model" in col. 12, line 63 is a second means that is applied "subsequent[ly]" in col. 12, line 64 to equations 33 and 34 as mentioned from col. 12, line 62 to col. 13, line 25 and illustrated in fig. 2 as horizontal arrows to derive equation 41 of column 13 that is used for calculating,...), on the basis of the coordinates ("[A]ffine model in col. 12, line 63 is a second means that is applied "subsequent[ly]" in col. 12, line 64 to equations 33 and 34 as mentioned from col. 12, line 62 to col. 13, line 25 and illustrated in fig. 2 as horizontal arrows to derive equation 41 of column 13 that is used for calculating on the basis of coordinates,(x_g, y_g) and (x,y) of equations 33 and 34.) of the corresponding points ("[A]ffine model" in col. 12, line 63 is a second means that is applied "subsequent[ly]" in col. 12, line 64 to equations 33 and 34 as mentioned from col. 12, line 62 to col. 13, line 25 and illustrated in fig. 2 as horizontal arrows to derive equation 41 of column 13 that is used for calculating, on the basis of coordinates,(x_g, y_g) and (x,y) of equations 33 and 34, which represent corresponding points as mentioned in col. 11, lines 40-46.)...

... found by the first means ("[A]ffine model" in col. 12, line 63 is a second means that is applied "subsequent[ly]" in col. 12, line 64 to equations 33 and 34 as mentioned from col. 12, line 62 to col. 13, line 25 and illustrated in fig. 2 as horizontal arrows to derive equation 41 of column 13 that is used for calculating on the basis of coordinates,(x_g, y_g) and (x,y) of equations 33 and 34, which represent corresponding points as mentioned in col. 11, lines 40-46 found by the first means or equations 33 and 34 in column 11 which is illustrated in fig. 2 as a vertical arrow that map between coordinates of distorted/corrected coordinates ,(x_g, y_g) and (x,y), respectively in col. 11, lines 65-67.),...

...geometric transform factors ("[A]ffine model" in col. 12, line 63 is a second means that is applied "subsequent[ly]" in col. 12, line 64 to equations 33 and 34 as mentioned from col. 12, line 62 to col. 13, line 25 and illustrated in fig. 2 as horizontal arrows to derive equation 41 of column 13 that is used for calculating, on the basis of coordinates,(x_g, y_g) and (x,y) of equations 33 and 34, which represent corresponding points as mentioned in col. 11, lines 40-46, found by the first means or equations 33 and 34 in column 11 which is illustrated in fig. 2 as a vertical arrow that map between coordinates of distorted/corrected coordinates,(x_g, y_g) and (x,y), respectively in col. 11, lines 65-67, geometric transform factors, (x_g, y_g) and (x'_g,y'_g) in equation 41 of column 13 where (x_g, y_g) is a "distorted pixel position[ ]" in col. 11, lines 64,65 in the images 220 and 240 of figure 2 that correspond with images of 210 and 230, respectively, and (x'_g, y'_g) is the "distorted pixel position[ ]" in col. 11, lines 64,65 denoted by the subscript "g" with "velocity components" in col. 3, lines 29,30 denoted with superscript " ' " where (x_g, y_g) and (x'_g, y'_g) corresponds with "undistorted" in col. 11, line 41 images of fig. 210 and 230, respectively, and mentioned col. 11, lines 40-45 and 65-67.) between said two images (fig. 2, numerals 220 and 240); and

c) third means for calculating (Equation 42: Ψ is a third means that is derived from the first means, equations 33 and 34 and second means, equation 41 for calculating,....), on the basis of coordinates of the corresponding points found by the first means (Equation 42: Ψ is a third means that is derived from the first means, equations 33 and 34 and second means, equation 41 for calculating, on the basis of coordinates,(x_g, y_g) and (x,y) of equations 33 and 34, which represent corresponding points as mentioned in col. 11, lines 40-46 found by the first means or equations 33 and 34 in column 11 which is illustrated in fig. 2 as a vertical arrow that map between coordinates of distorted/corrected coordinates ,(x_g, y_g) and (x,y), respectively in col. 11, lines 65-67.) and the geometric transform factors (Equation 42: Ψ is a third means that is derived from the first means, equations 33 and 34 and second means, equation 41 for calculating, on the basis of coordinates,(x_g, y_g) and (x,y) of equations 33 and 34, which represent corresponding points as mentioned in col. 11, lines 40-46 found by the first means or equations 33 and 34 in column 11 which is illustrated in fig. 2 as a vertical arrow that map between coordinates of distorted/corrected coordinates ,(x_g, y_g) and (x,y), respectively in col. 11, lines 65-67 and geometric transform factors ,(x_g, y_g) and (x'_g,y'_g).) found by the second means (Affine motion model in col. 12, lines 62-64),...

... a lens distortion factor(Equation 42: Ψ is a third means that is derived from the first means, equations 33 and 34 and second means, equation 41 for calculating, on the basis of coordinates,(x_g, y_g) and (x,y) of equations 33 and 34, which represent corresponding points as mentioned in col. 11, lines 40-46 found by the first means or equations 33 and 34 in column 11 which is illustrated in fig. 2 as a vertical arrow that map between coordinates of distorted/corrected coordinates ,(x_g, y_g) and (x,y), respectively in col. 11, lines 65-67 and geometric transform factors ,(x_g, y_g) and (x'_g,y'_g) found by the second means, a lens distortion factor,"κ_7" in col.11, line 65 and col. 13, line 66 that is "estimate[d]" in col. 13, line 62 using the equation 42: "Ψ" of column 13 where equation 42 is derived from equation 41 or second means that generated the claimed transform factors (x_g, y_g) and (x'_g,y'_g) which in turn is derived from equation 33 and 34 or the first means that generated the claimed coordinates (x_g, y_g) and (x,y) of equations 33 and 34.)

Regarding claim 2, Altunbasak et al. discloses the lens distortion factor calculating apparatus according to claim 1, characterized in that the first means comprises:

a) means ("motion estimation" models from col. 1, line 67 to col. 2, line 3.) for extracting ("recognized" in col. 2, line 1) an overlapped portion ("successive overlapping images" in col. 1, lines 64,65) of the two images (fig. 2, numerals 210 and 230 are successive overlapping images.) picked up by the image pick-up means (fig. 1, num. 110 is an image capture device in col. 2, line 39.),

b) means for extracting, from the overlapped portion ("successive overlapping images" in col. 1, lines 64,65) of one of the images (fig. 2, num. 210) with the other image (fig. 2, num. 230), a plurality of partial images ("small rectangular regions" in col. 13, line 43) effective for tracking (Using optical flow a trajectory of a pixel is followed as mentioned in col. 2, lines 52,53. The small rectangular regions correspond to x_g, which is a "OFE [optical flow equation]...equation" as mentioned in col. 11, lines 54-64.) by an optical flow (Section: "Optical flow" in col. 2, line 51 has an OFE equation 10 located in column 4.) between both the images (Fig. 2, numerals 210 and 230 which correspond to equation 10 with two images I_1 and I_2.) as feature points (rectangular "regions with features" as mentioned in col. 13, lines 41-47), and

c) means for tracking a point (A "motion vector" is used for each pixel in col. 2, lines 22-26 and col. 5, lines 10,11.), which corresponds (The motion vector is used for mapping pixels from one frame to another in col. 12, lines 62-63. Note that a motion vector is generated in an affine motion model which represents a vector as a set of parameters and pixel location as mentioned in col. 5, lines 13-15 and col. 6, lines 48,49.) to each of the feature points (The affine motion model is used with the rectangular "regions with features" as mentioned in col. 13, lines 41-53.) on the one image (fig. 2, num. 210), on the other image (fig. 2, num. 230) on the basis of the optical flow (The affine motion model represents a motion vector is based on optical flow equation. The equation at the bottom of column 6 is based on equation 9 in column 3 which is an optical flow equation described in the section of "Optical flow" from col. 2, line 51to col. 4, line 67.) between both the images (Equations 38 and 39 in column 13 is a mapping from one frame to another frame as mentioned in col. 13, lines 19,20 Additionally, fig. 2 shows the mapping from one frame to another.).

Claim 3 was addressed in claim 1.

Claims 4,6,8,10 and 12 were addressed in claim 2.

Claim 5 is similar to claim 1 except for the limitation of a computer readable recording medium (fig. 1, num. 130) having a lens distortion factor calculation program (fig. 1, num. 130 has "instructions" in col. 2, lines 40,41.) which is disclosed by Altunbasak et al.

Claim 7 is similar to claim 1 except for the additional limitations of a means and method:

d) fourth means ("A hybrid system" in col. 13, line 59 is a fourth means.) for subjecting the first image (fig. 2, num. 220) and the second image (fig. 2, num. 240) to lens distortion correction ("A hybrid system" in col. 13, line 37 is a fourth means for subjecting the first image 220 and second image 240 to lens distortion correction or "Nonlinear Geometric Correction" in col. 13, line 25) on the basis of the lens distortion factor ("A hybrid system" in col. 13, line 59 is a fourth means for subjecting the first image 220 and second image 240 to lens distortion correction or "Nonlinear Geometric Correction" in col. 13, line 25 on the basis of κ_7 which is the claimed lens distortion factor; equation 42 or "Ψ" that is a function of lens-distortion κ_7 in col. 11, line 65 and col. 13, lines 34,35.) calculated by the third means ("A hybrid system" in col. 13, line 59 is a fourth means for subjecting the first image 220 and second image 240 to lens distortion correction or "Nonlinear Geometric Correction" in col. 13, line 25 on the basis of κ_7 which is the claimed lens distortion factor, κ_7 in col. 11, line 65 and col. 13, lines 34,35,66 in equation 42 or "Ψ" in col. 13, line 65 that is a function of lens-distortion, calculated by the third means or equation 42: Ψ or "Ψ" in col. 13, line 65 modified with a "one-dimensional optimization technique" in col. 13, lines 61,62.); and

e) fifth means (Fig. 3 is a fifth means.) for combining (Fig. 3 is a fifth means that corresponds to "Motion estimate techniques" in col. 1, line 63 for combining or to "stitch together" in col. 1, line 54.) the first image (fig. 2, num. 220) and the second image (fig. 2, num. 240), which have been subjected to the lens distortion correction ("Nonlinear Geometric Correction" in col. 13, line 25), obtained by the fourth means ("A hybrid system" in col. 13, line 59) using the geometric transform factors ((x_g, y_g) and (x'_g,y'_g) in equation 41 of column 13) between the first image (fig. 2, num. 220) and the second image (fig. 2, num. 240) which have been subjected to the lens distortion correction ("Nonlinear Geometric Correction" in col. 13, line 25).

Claim 9 was addressed in claim 7.

Claim 11 was addressed in claims 5 and 7.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dennis Rosario whose telephone number is (571) 272-7397. The examiner can normally be reached on 6-3.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on (571) 272-7695. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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